UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
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Narindahr Kumar

TO: ~~Jon D. Johnston,~~ Chief
RCRA ~~Programs~~ Compliance Branch
Waste Management Division
USEPA Region 4

John Litton, P.E., Director
Division of Waste Management
Bureau of Land and Waste Management
S.C. Department of Health and Environmental Control

FROM: Dann Spariosu, Project Manager
Federal Facilities Branch
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USEPA Region 4

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Corrective Action Engineering Section
Division of Waste Management
Bureau of Land and Waste Management
S.C. Department of Health and Environmental Control

THRU: Annie Godfrey, Chief
NC-SC-GA Federal Oversight Section
Federal Facilities Branch
Waste Management Division
USEPA Region 4

DATE: September 30, 2004

RE: Evaluation of Myrtle Beach Air Force Base's status under the RCRA Info Corrective Action Environmental Indicator Event Codes (CA725 and CA750)
EPA I.D. Number SC7 570 024 821

CC: Caron Falconer, Chief, RCRA North Programs Section, USEPA Region 4

I. PURPOSE OF MEMO

This memo is written to formalize an evaluation of the status of Myrtle Beach Air Force Bases (MBAFB) in relation to the following corrective action event codes defined in the Resource Conservation and Recovery Act Information System (RCRA Info):

1. Current Human Exposures Under Control (CA725),

2. Migration of Contaminated Groundwater Under Control (CA750).

Concurrence by the RCRA Programs Branch Chief and Director of the Division of Waste Management is required prior to entering these event codes into RCRA Info. Your concurrence with the interpretations provided in the following paragraphs, and the subsequent recommendations, is satisfied by dating and signing at the appropriate location within Attachments 1 and 2.

II. HISTORY OF ENVIRONMENTAL INDICATOR EVALUATIONS AT THE FACILITY AND REFERENCE DOCUMENTS

This particular evaluation is the third evaluation for MBAFB. The previous evaluations were dated September 30, 1998, and August 30, 2002. The results of the later evaluation recommended that CA725 YE and CA750 NO be entered into RCRA Info. The CA 750 NO is due to the fact that while human exposures to contamination were controlled for soil, groundwater, and surface water; the migration of contaminated groundwater remaineduncontrolled at the facility.

III. FACILITY SUMMARY

The MBAFB is located in northeastern South Carolina and occupies approximately 3800 acres in southeastern Horry County. Runways on the facility served as a municipal airport prior to 1940 and from 1947 to 1954. The Army Air Corps incorporated the airport into the National Defense program from 1940 to 1947. In 1954, the airport was donated to the Air Force. MBAFB was host to the 354th Tactical Fighter Wing under the direction of the Tactical Air Command prior to closure. The Base was officially closed on March 31, 1993 under the Base Realignment and Closure (BRAC) Act.

The Base lies in a geographic area referred to as the Grand Strand, which is an established resort area along the East Coast. Communities in the vicinity of MBAFB include Myrtle Beach, Socastee, Surfside, North Myrtle Beach, and Garden City. Land use surrounding the Base is mainly wetlands, timberland, and undeveloped areas.

The Base currently has identified 257 Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs), including 6 landfills and 2 regulated units that have been clean closed. Of the 6 landfills, 3 currently have a low permeability cap and 3 have dermal covers adequate to protect human health. All corrective action at the site is performed in accordance with an EPA 3008(h) Order that was finalized in 1995.

IV. CONCLUSION FOR CA725

As outlined in Attachment 1, there are currently no complete human health exposure pathways to contamination at the MBAFB. This conclusion is based on current conditions and data, and is summarized for soil, sediment, groundwater, surface water, and air media below.

Soil and Sediment

Soil and sediments have been impacted in the past by contamination from SWMUs and AOCs at MBAFB however, exposure to this contamination has been controlled by Interim Measures performed by the facility and currently there is no known threat to human health.

At SWMUs 91-101, the Vehicle Maintenance Area (addressed as one contiguous unit), approximately 420 cubic yards of soil contaminated with Volatile Organic Compounds (VOCs) were excavated and disposed of in 1997. This IM also involved removal of an Oil/Water Separator (OWS) and several Underground Storage Tanks (USTs) in 1993.

Contaminated soils and sediments were removed from SWMU 14, Polishing Ponds, in 1996. At SWMU 255, Forward Operating Location Training Area, approximately 100 cubic yards of contaminated soil was removed in 1997. In addition, a septic tank (SWMU 211) and an OWS (SWMU 13) were removed in 1996.

At SWMU 256, Building 575, chlorinated VOCs, although present in the groundwater, were not detected in the soils or surface water. At SWMU 11, a Fire Training Area, subsurface soil contaminated with chlorinated VOCs were removed as part of an IM. At SWMU 141, the Old Entomology Shop, approximately 4,000 tons of soil and sediments contaminated with pesticides were removed in 1998. In addition to this, removal actions have been performed for contaminated sediments at several locations in the base wide drainage ditch system.

Finally, at SWMU 140, the Firing-In Buttress, the U.S. Army Corps of Engineers (USACE) Huntsville Office removed 35,000 20mm Training Rounds from surface soils in 2001.

Groundwater

While groundwater is contaminated at several SWMUs at MBAFB, the groundwater currently is not being used as a drinking water source at the Base or at surrounding properties, and therefore does not pose a threat to human health. It should be noted that at SWMU 141, the Old Entomology Shop, groundwater contaminated with chlorinated VOCs has migrated off-site and impacted an adjoining property. There are two known private wells nearby that are used for irrigation purposes only. These wells have been sampled and analyzed, and at this time do not show any detections of contaminants above relevant action levels.

Surface Water

Surface water has been sampled in the vicinity of several SWMUs where contaminated groundwater could potentially be contributing to surface water base flow in the ditch system. Specifically, ditches adjacent to SWMUs 91-101 (Vehicle Maintenance Area),

SWMU 256 (Building 575), SWMU 141 (Old Entomology Shop), and SWMU 11 (Fire Training Area FT-11) have been and/or continue to be sampled. Sampling results have not shown contamination above relevant action levels.

Air

Releases to air from soil, groundwater, sediments, and/or surface water contaminated by SWMUs or AOCs at MBAFB are not known to have occurred or be occurring above relevant action levels.

Based on the information provided above, it is recommended that CA725 YE be entered into RCRA Info for the MBAFB.

V. CONCLUSION FOR CA750

As outlined in Attachment 2, groundwater is contaminated at several SWMUs on MBAFB. Interim Measures and/or final remedies have been proposed or implemented at all of these SWMUs. Specifically, groundwater is contaminated with VOCs at SWMU 11 (Fire Training Area FT-11), SWMU 12 (Fire Training Area FT-16), SWMUs 91-101 (Vehicle Maintenance Area), SWMU 141 (Old Entomology Shop), SWMU 255 (Forward Operations Location Training Area), SWMU 256 (Building 575) and SWMU 79/80 (Armament Shop OT-40). In addition to this, VOCs have been detected in the vicinity of SWMU 81 (POL Storage Area).

VOC contamination at SWMU 141 (Old Entomology Shop) has migrated off-site onto property adjacent to the Base. A legal dispute between the Air Force and the adjacent property owner had prevented the implementation of a groundwater extraction system until June 2003. The system is now operating and appears to be controlling the VOC plume at this location. The final barriers to a CA750 YE determination have been the control of the SWMU 141 plume and the control of the SWMU 256 plume, along with an analysis of the impact of the plume's discharge to surface water.

Based on the above information, it is recommended that CA750 YE be entered into RCRA Info for the MBAFB.

VI. SUMMARY OF FOLLOW-UP ACTIONS (Discussion of What is Needed to Get to Yes, with EI Interim Milestone Schedule)

A. CA750 – Of the 8 areas listed above with known groundwater contamination, SWMU 79/80 has a groundwater extraction and treatment system installed and approved as the final remedy. SWMUs 91-101 and SWMU 256 have had groundwater extraction systems implemented as Interim Measures. Due to the success of the groundwater extraction system at SWMUs 91-101, and the low levels of contamination at these SWMUs, the Air Force is proposing to continue groundwater extraction, coupled with Monitored Natural Attenuation (MNA) as the final remedy. The Air Force is also proposing a continuation of groundwater extraction, coupled with in situ chemical oxidation at SWMU 256 for a final remedy. At SWMU 11, a source area soil removal was performed as an Interim Measure. The Air Force is proposing that the source removal be the primary component of the final

remedy, supplemented by in situ chemical oxidation and in situ enhanced bioremediation. The final remedy being proposed for SWMU 12 and SWMU 255 is in situ enhanced bioremediation (oxygen releasing compound) with MNA.

The POL Storage Area (SWMU 81) is being investigated to determine the path forward for achieving final remedy in place. A determination has been made that the migration of contaminated groundwater at this SWMU is controlled.

The groundwater plume at SWMU 141 is currently being controlled by the installed groundwater extraction system which was installed as an Interim Measure. Due to the success of this extraction system, it will likely form a major component of the final remedy.

The following is a list of SWMUs that will end up with LUCs:

SWMUs 1 and 4	LFs-9 and 12
SWMU 2	LF – 13
SWMU 3/7	LF-05, and WP-01
SWMU 5	LF-14
SWMUs 6/133	WP-08
SWMUs 9/10	FT-6/7
SWMU 11	FT-11
SWMU 12	FT-16
SWMU 40	Bldg 324
SWMUs 79/80	Bldg 505
SWMU 81	POL Yard
SWMUs 91-101	VMA
SWMU 140	Fire-In Buttress
SWMU 141	OES
SWMU 142	Misque Dump
SWMU 255	FOLTA
SWMU 256	Bldg 575

The following provides additional information on each SWMU, and how LUCs should continue. They are broken into like categories.

SWMU #	Common Name	Remedy	LUCs continue until…
1,4	LFs-9, and12	2' Cover, GW-LTM, LUCs	In perpetuity
2	LF-13	2' Cover, GW-LTM, LUCs	In perpetuity
3,7	LF-05, & WP-01	2' Cover, GW-LTM, LUCs	In perpetuity
5	LF-14	2' Cover, GW-LTM, LUCs	In perpetuity
142	Misque Dump	*We want a 2' Cover, GW-LTM, LUCs	In perpetuity
6/133	WP-08	MNA, LUCs	Until GW is below MCLs
9/10	FT-6/7	ORC Injection, MNA, LUCs	Until GW is below MCLs
11	FT-11	Soil Removal, GW Injection/extraction, MNA, LUCs	Until GW is below MCLs
12	FT-16	MNA, LUCs	Until GW is below MCLs
40	B.324	GW Extraction, MNA, LUCs	Until GW is below MCLs
79/80	B.505	GW Extraction, MNA, LUCs	Until GW is below MCLs
81	POL Yard	???	Until GW is below MCLs
91-101	VMA	GW Extraction, MNA, LUCs	Until GW is below MCLs
141	OES	Soil Removal, GW Extraction, MNA, LUCs	Until GW is below MCLs
255	FOLTA	Soil Removal, MNA, LUCs	Until GW is below MCLs
256	B.575	GW Injection/Extraction, MNA, LUCs	Until GW is below MCLs
140	Fire-In Buttress (FIB)	FIB fill Material Removal, UXO Clearance by USACE	LUCs need to specify that UXO might still exist here

The LUCs have not been finalized or documented officially for any of these SWMUs.

ATTACHMENT 1
DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
RCRA Corrective Action
Environmental Indicator (EI) RCRIS Code (CA725)
Current Human Exposures Under Control

Facility Name: **Myrtle Beach Air Force Base**
Facility Address: **1089 Howard Parkway, Myrtle Beach, SC 29577**
Facility EPA ID #: **SC7 570 024 821**

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

   X If yes - check here and continue with #2 below,

   ____ If no - re-evaluate existing data, or

   ____ If data are not available skip to #6 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land - and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land - and groundwater-use conditions ONLY, and do not consider potential future land - or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be "**contaminated**"[1] above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

Media	Yes	No	?	Rationale/Key Contaminants
Groundwater	X			VOCs
Air (indoors)[2]		X		
Surface Soil (e.g., <2 ft)		X		
Surface Water		X		
Sediment		X		
Subsurface Soil (e.g., >2 ft)	X			Landfills/Unknown
Air (outdoors)		X		

____ If no (for all media) - skip to #6, and enter "YE" status code after providing or citing appropriate "levels" and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

__X__ If yes (for any media) - continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

____ If unknown (for any media) - skip to #6 and enter "IN" status code.

Rationale and Reference(s): Contaminated groundwater at SWMUs 11, 12, 81, 91-101,141, 255, 256, and possibly 142. All subsurface soil contamination is in landfills which have either dermal covers or Subtitle D covers. References are located on last page of this attachment.

3. Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land - and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table
Potential **Human Receptors** (Under Current Conditions)

"Contaminated" Media	**Residents**	**Workers**	**Day-Care**	**Construction**	**Trespassers**	**Recreation**	**Food**[3]

[1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

[2] Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

Summary Exposure Pathway Evaluation Table Potential **Human Receptors** (Under Current Conditions)							
Groundwater	No	No	No	No	N/L	N/L	No
Air (indoors)	No	No	No	N/L	N/L	N/L	N/L
Soil (surface, e.g., <2 ft)	No	No	No	No	No	No	No
Surface Water	No	No	N/L	N/L	No	No	No
Sediment	No	No	N/L	N/L	No	No	No
Soil (subsurface, e.g., >2 ft)	N/L	N/L	N/L	No	N/L	N/L	No
Air (outdoors)	No	No	No	No	No	N/L	N/L

Instructions for Summary Exposure Pathway Evaluation Table:

1. For Media which are not "contaminated" as identified in #2, please strike-out specific Media, including Human Receptors - spaces, or enter "N/C" for not contaminated.

2. Enter "yes" or "no" for potential "completeness" under each "Contaminated" Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media - Human Receptor combinations (Pathways) do not have assigned spaces in the above table. While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

__X__ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

____ If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.

____ If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code

Rationale and Reference(s):_See last page of attachment for references.

_____
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_____
_____
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_____
_____

[3] Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

4 Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be "**significant"**[4] (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

____ If no (exposures can not be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant".

____ If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant".

____ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

Rationale and Reference(s):_____
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5 Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?

____ If yes (all "significant" exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

____ If no (there are current exposures that can be reasonably expected to be "unacceptable")- continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

____ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

Rationale and Reference(s):_____
_____
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6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

[4] If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

__X__ YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Myrtle Beach Air Force Base facility, EPA ID# **SC7 570 024 821,** located at 1089 Howard Parkway, Myrtle Beach, SC 29577 under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

____ NO - "Current Human Exposures" are NOT "Under Control"

____ IN - More information is needed to make a determination.

Completed by (signature)_____ Date:
(print) David M. Scaturo, P.E., P.G.
(title) Manager, Corrective Action Engineering Section

Completed by (signature)_____ Date:
(print) Dann Spariosu, Ph.D.
(title) BRAC Project Manager, Federal Facilities Branch

Supervisor (signature)_____ Date:
(print) John Litton, P.E.
(title) Director, Division of Waste Management
(EPA Region or State) SCDHEC

Supervisor (signature)_____ Date
(print) Annie Godfrey
(title) Chief, DoD A Section, Federal Facilities Branch
(EPA Region or State) EPA Region 4

Final Note: The human exposures EI is a qualitative screening of exposures and the determinations within this document should not be used as the sole basis for restricting the scope of more detailed (E.G., site-specific) assessments of risk.

Locations where References may be found:

SCDHEC, BLWM, 8901 Farrow Rd., Suite 109, Columbia, SC 29210
EPA Region 4, Atlanta Federal Center, 61 Forsyth St SW, Atlanta, GA 30303
Chapin Memorial Library, 400 14th Ave, North Myrtle Beach, SC 29577

Contact telephone and e-mail numbers:

(name) __David Scaturo/Dann Spariosu
(phone #)_803-896-4185/404-562-8552
(e-mail)__scaturdm@dhec.sc.gov/spariosu.dann@epamail.epa.gov

References:

Final RFI Report, Building 575 (SWMU 256), MBAFB, IT Corp., June 2000
Focused CMS Building 575 (SWMU 256), MBAFB, IT Corp., June 2001
Final Supplemental RFI, Fire Training Area FT-11 (SWMU 11), MBAFB, IT Corp., August 1998
Internal Draft CMS, Fire Training Area FT-11 (SWMU 11), MBAFB, IT Corp., 2001
Final RFI, Vehicle Maintenance Area (SWMUs 91-101), MBAFB, IT Corp., March 2000
Draft Focused CMS, Vehicle Maintenance Area (SWMUs 91-101), MBAFB, IT Corp., September 2001
Final RFI, Old Entomology Shop (SWMU 141), MBAFB, IT Corp., September 1996
Final Groundwater RFI, Old Entomology Shop (SWMU 141), MBAFB, IT Corp., September 1999
Focused CMS, Old Entomology Shop (SWMU 141), MBAFB, IT Corp., January 2002
Site Specific Draft Final Report, OE Removal Actions, MBAFB, USACE Huntsville, August 2001
Final Report of Findings, Metals and Nitroaromatics Investigation, Firing-In Buttress (SWMU 140) and Third Street Site. MBAFB, IT Corp., February 2002
RFI at Fire Training Area 4, FT-16 (SWMU 12), Oil/Water Separator (SWMU 13), Polishing Pond (SWMU 14), Septic Tank (SWMU 211), and AOC FOLTA (SWMU 255), MBAFB, IT Corp., October 2000
Draft Focused CMS, Fire Training Area 4, FT-16 (SWMU 12) and FOLTA (SWMU 255), MBAFB, IT Corp., June 2002

ATTACHMENT 2
DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
RCRA Corrective Action
Environmental Indicator (EI) RCRIS Event Code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: Myrtle Beach Air Force Base
Facility Address: 1089 Howard Parkway, Myrtle Beach, SC 29577
Facility EPA ID #: SC7 570 024 821

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

   X If yes - check here and continue with #2 below,

   ____ If no - re-evaluate existing data, or

   ____ If data are not available, skip to #8 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The three EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Migration of Contaminated

Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRA INFO national database ONLY as long as they remain true (i.e., RCRA INFO status codes must be changed when the regulatory authorities become aware of contrary information).

2. Is **groundwater** known or reasonably suspected to be "**contaminated"**[5] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

   __X__ If yes - continue after identifying key contaminants, citing appropriate "levels" and referencing supporting documentation.

   ____ If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated"

   ____ If unknown - skip to #8 and enter "IN" status code.

   Rationale and Reference(s):_ TCE and its daughter products, Benzene, Metals. See last page of attachment for references. _____
   _____
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3. Has the **migration** of contaminated groundwater **stabilized** such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[6] as defined by the monitoring locations designated at the time of this determination?

   __X__ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[6]).

   ____ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[6]) - skip to #8 and enter "NO" status code, after providing an explanation.

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[5] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):_____
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_____

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

__X__ If yes - continue after identifying potentially affected surface water bodies.

____ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s): Groundwater contaminated with CVOCs is discharging into a drainage ditch at SWMU 256._____
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5. Is the **discharge** of "contaminated" groundwater into surface water likely to be "**insignificant"** (i.e., the maximum concentration[7] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level" and there are no other conditions (e.g., the nature and number of discharging contaminants, or environmental setting) which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

__X__ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration[7] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) providing a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

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[6] "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

____ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration[7] of <u>each</u> contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations[7] greater than 100 times their appropriate groundwater "levels," providing the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identifying if there is evidence that the amount of discharging contaminants is increasing.

____ If unknown – enter "IN" status code in #8.

Rationale and Reference(s):___<u>Groundwater contaminated with CVOCs is discharging into a drainage ditch at SWMU 256. Surface water samples taken at a location where the highest concentrations from groundwater discharge would be expected yield concentrations of 3.88 ug/kg for cis-1,2-dichlorethene and 0.333J for Trichlorethene. Both of these concentrations are below their respective MCLs.</u>

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable"** (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[8])?

____ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment,[9] appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-

[7] As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

[8] Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

[9] The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

____ If no - (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable"**) - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

____ If unknown - skip to 8 and enter "IN" status code.

Rationale and Reference(s):_____

7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

__X__ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination"

____ If no - enter "NO" status code in #8.

____ If unknown – enter "IN" status code in #8.

Rationale and Reference(s):__SWMU 256: A Statement of Basis selecting in situ chemical oxidation and groundwater extraction is out for public comment at this date. Groundwater extraction has begun as an interim measure. Ground and surface water samples define the edges of the plume and sampling will continue on a quarterly basis.

SWMU 141: Groundwater extraction (2 wells) is ongoing. Monitoring wells define the plume configuration. Monitoring will be performed on a quarterly or semiannual basis for the forseeable future.

8. Check the appropriate RCRA INFO status codes for the "Migration of Contaminated Groundwater Under Control" EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

__X__ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the

"Migration of Contaminated Groundwater" is "Under Control" at the Myrtle Beach Air Force Base facility, EPA ID # SC7 570 024 821, located at 1089 Howard Parkway, Myrtle Beach, SC 29577. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

_____ NO - Unacceptable migration of contaminated groundwater is observed or expected.

_____ IN - More information is needed to make a determination.

Completed by (signature) David Scaturo Date: 9-30-04
(print) David Scaturo, P.E., P.G.
(title) Manager, Corrective Action Engineering Section

Completed by (signature) Dann Spariosu Date: 9/28/04
(print) Dann Spariosu, Ph.D.
(title) BRAC Project Manager, Federal Facilities Branch

Supervisor (signature) John Litton Date:
(print) John Litton, P.E.
(title) Director, Division of Waste Management
(EPA Region or State) SCDHEC

Supervisor (signature) Annie M. Godfrey Date: 9/28/04
(print) Annie Godfrey
(title) Chief, DoD A Section, Federal Facilities Branch
(EPA Region or State) EPA Region 4

Locations where References may be found:

SCDHEC, BLWM, 8901 Farrow Rd., Suite 109, Columbia, SC 29210
EPA Region 4, Atlanta Federal Center, 61 Forsyth St SW, Atlanta, GA 30303
Chapin Memorial Library, 400 14th Ave, North Myrtle Beach, SC 29577

Contact telephone and e-mail numbers:

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References:

Draft Focused Corrective Measure Study, Fire Training Area, FT-16 (SWMU 12) And FOLTA (SWMU 255), Myrtle Beach Air Force Base, South Carolina, IT Corporation, June 2002.
April 2002 Quarterly Groundwater Monitoring Report, Building 575 (SWMU 256), Myrtle Beach Air Force Base, South Carolina, IT Corporation, June 2002.
May 2002 Quarterly Groundwater Monitoring Report, Vehicle Maintenance Area (SWMUs 91 through 101), Myrtle Beach Air Force Base, South Carolina, IT Corporation, July 2002.
May 2002 Semiannual Groundwater Monitoring Report, MOGAS Site (SWMU 101) UST Permit #13356, Myrtle Beach Air Force Base, South Carolina, IT Corporation, July 2002.
Final Focused Corrective Measure Study, Vehicle Maintenance Area (SWMUs 91 Through 101), Myrtle Beach Air Force Base, South Carolina, IT Corporation, July 2002.
May 2002 Quarterly Groundwater Monitoring Report, Old Entomology Shop, SD-24 (SWMU 141), Myrtle Beach Air Force Base, South Carolina, IT Corporation, August 2002.
May 2002 Quarterly Groundwater Monitoring Report, Fire Training Area FT-11 (SWMU 11), Myrtle Beach Air Force Base, South Carolina, IT Corporation, August 2002.
July 2002 Quarterly Groundwater Monitoring Report, Building 575 (SWMU 256), Myrtle Beach Air Force Base, South Carolina, IT Corporation, October 2002.
August 2002 Quarterly Groundwater Monitoring Report, Fire Training Area FT-16 (SWMU 12) and FOLTA (SWMU 255), Myrtle Beach Air Force Base, South Carolina, IT Corporation, October 2002.
Report of Findings, Pilot-Scale Potassium Permanganate Injection, Fire Training Area FT-11 (SWMU 11), Myrtle Beach Air Force Base, South Carolina, IT Corporation, October 2002.
August 2002 Quarterly Groundwater Monitoring Report, Old Entomology Shop, SD-24 (SWMU 141), Myrtle Beach Air Force Base, South Carolina, IT Corporation, October 2002.
2002 Corrective Action Progress Report, POL Yard (SWMU 81, Site ID #13588), Myrtle Beach Air Force Base, South Carolina, IT Corporation, November 2002.
August 2002 Quarterly Groundwater Monitoring Report, Fire Training Area FT-11 (SWMU 11), Myrtle Beach Air Force Base, South Carolina, IT Corporation, December 2002.
Final 2002 Annual Groundwater Monitoring Report, Fire Training Area FT-11 (SWMU 11), Myrtle Beach Air Force Base, South Carolina, IT Corporation, February 2003.
Draft RCRA Facility Investigation Work Plan, Petroleum, Oil, and Lubricants (POL) Yard (SWMU 81), Myrtle Beach Air Force Base, South Carolina, IT Corporation, March 2003.
Draft 2002 Annual Groundwater Monitoring Report, Building 575 (SWMU 256), Myrtle Beach Air Force Base, South Carolina, IT Corporation, April 2003.
January 2003 Quarterly Groundwater Monitoring Report, Building 575 (SWMU 256),

Myrtle Beach Air Force Base, South Carolina, IT Corporation, April 2003.

Draft 2002 Annual Groundwater Monitoring Report, Vehicle Maintenance Area (SWMUs 91 through 101), Myrtle Beach Air Force Base, South Carolina, IT Corporation, May 2003.

2002 Annual Groundwater Monitoring Report, MOGAS Site (SWMU 101) UST Permit #13356, Release #1, Myrtle Beach Air Force Base, South Carolina, IT Corporation, May 2003.

Addendum 1 to the Interim Corrective Measure Plan for Groundwater, Old Entomology Shop (SWMU 141) and Sewage Treatment Plant (SWMU 84/85), Former Myrtle Beach Air Force Base, South Carolina, IT Corporation, May 2003.

February 2003 Quarterly Groundwater Monitoring Report, Old Entomology Shop, SD-24 (SWMU 141), Myrtle Beach Air Force Base, South Carolina, Shaw Environmental, Inc., June 2003.

May 2003 Corrective Action Progress Report, POL Yard (SWMU 81, Site #13588), Myrtle Beach Air Force Base, South Carolina, Shaw Environmental, Inc. June 2003.

March 2003 Quarterly Groundwater Monitoring Report, Fire Training Area FT-11 (SWMU 11), Myrtle Beach Air Force Base, South Carolina, Shaw Environmental, Inc., June 2003.

Draft 2002 Annual Groundwater Monitoring Report, FT-16 (SWMU 12) and FOLTA (SWMU 255), Myrtle Beach Air Force Base, South Carolina, Shaw Environmental, Inc.,

June 2003.

Draft 2002 Annual Groundwater Monitoring Report, Fire Training Area FT-11 (SWMU 11), Myrtle Beach Air Force Base, South Carolina, Shaw Environmental, Inc., July 2003.

May 2003 Quarterly Groundwater Monitoring Report, Building 575 (SWMU 256), Myrtle Beach Air Force Base, South Carolina, Shaw Environmental, Inc., July 2003.

February 2003 Quarterly Groundwater Monitoring Report, FT-16 (SWMU 12) and FOLTA (SWMU 255), Myrtle Beach Air Force Base, South Carolina, Shaw Environmental, Inc., July 2003.

May 2003 Quarterly Groundwater Monitoring Report, FT-16 (SWMU 12) and FOLTA (SWMU 255), Myrtle Beach Air Force Base, South Carolina, Shaw Environmental, Inc.,

August 2003.

June 2003 Quarterly Groundwater Monitoring Report, Fire Training Area FT-11 (SWMU 11), Myrtle Beach Air Force Base, South Carolina, Shaw Environmental, Inc., August 2003.

May/June 2003 Quarterly Groundwater Monitoring Report, Old Entomology Shop, SD-24 (SWMU 141), Myrtle Beach Air Force Base, South Carolina, Shaw Environmental, Inc., August 2003.

Final RCRA Facility Investigation Work Plan, Petroleum, Oil, and Lubricants (POL) Yard (SWMU 81), Myrtle Beach Air Force Base, South Carolina, Shaw Environmental, Inc., August 2003.

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Myrtle Beach Air Force Base, South Carolina, Shaw Environmental, Inc., October 2003.

August 2003 Quarterly Groundwater Monitoring Report, FT-16 (SWMU 12) and FOLTA (SWMU 255), Myrtle Beach Air Force Base, South Carolina, Shaw Environmental, Inc., October 2003.

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Final Corrective Measures Study, Fire Training Area FT-11 (SWMU 11), Myrtle Beach Air Force Base, South Carolina, Shaw Environmental, Inc., January 2004.

Draft 2003 Annual Groundwater Monitoring Report, Vehicle Maintenance Area (SWMUs 91 thriugh 101), Myrtle Beach Air Force Base, South Carolina, Shaw Environmental, Inc., February 2004.

2003 Annual Groundwater Monitoring Report, MOGAS Site (SWMUY 101) UST Permit #13556, Release #1, Myrtle Beach Air Force Base, South Carolina, Shaw Environmental, Inc., February 2004.

Draft 2003 Annual Groundwater Monitoring Report, FT-16 (SWMU 12) and FOLTA (SWMU 255), Myrtle Beach Air Force Base, South Carolina, Shaw Environmental, Inc., March 2004.

Construction Report, Groundwater Interim Corrective Measure, Old Entomology Shop (SWMU 141), Myrtle Beach Air Force Base, South Carolina, Shaw Environmental, Inc., March 2004.